WHAT IS CLAIMED IS:

1. A high efficiency amplifier, connected to a non-reciprocal circuit element, having an input impedance lower than a standard impedance and an output impedance substantially equal to said standard impedance, comprising:

an input terminal to receive an input signal;

an output terminal connected to said non-reciprocal circuit element;

an amplifier element to amplify said input signal; and

one or a plurality of harmonic processing circuits arranged between said amplifier element and said output terminal to process a harmonic in an output signal of said amplifier element.

2. The high efficiency amplifier according to claim 1, wherein

said standard impedance is 50 ohm and

an output impedance at said output terminal is substantially in the range from 3 ohm to 30 ohm.

3. The high efficiency amplifier according to claim 2, wherein

at least one of said one or plurality of harmonic processing circuits matches impedance of said harmonic.

4. The high efficiency amplifier according to claim 2, wherein

at least one of said one or plurality of harmonic processing circuits suppresses harmonic-related power leakage caused by said harmonic.

5. The high efficiency amplifier according to claim 2, wherein

at least one of said one or plurality of harmonic processing circuits serves as an open circuit load to said harmonic.

6. The high efficiency amplifier according to claim 2, wherein

at least one of said one or plurality of harmonic processing circuits serves as a short circuit load to said harmonic.

7. The high efficiency amplifier according to claim 1, wherein resonance frequency of said plurality of harmonic processing circuits are different from each other.

8. The high efficiency amplifier according to claim 1, further comprising

a fundamental wave regulator circuit between said amplifier element and said output terminal to perform a fine adjustment of an impedance of a fundamental wave in an output signal of said amplifier element.

9. The high efficiency amplifier according to claim 1, wherein

said harmonic processing circuit is constituted of a capacitance element and a parasitic inductor coupled to said capacitance element.

10. The high efficiency amplifier according to claim 9, wherein said capacitance element is a chip capacitor.

11. The high efficiency amplifier according to claim 9, wherein said parasitic inductor is a microstrip line.

12. The high efficiency amplifier according to claim 1, further comprising

a coupled circuit arranged between said amplifier element and said output terminal, and

said coupled circuit includes

a first output terminal to output power of an amount corresponding to an input power to said output terminal side, and

a second output terminal to output power of an amount corresponding to a predetermined ratio of power output from said first output terminal.

13. The high efficiency amplifier according to claim 1, further

comprising

an output matching circuit, including said one or plurality of harmonic processing circuits, to match an impedance of an output signal of said amplifier element, and

said output matching circuit is constituted only of

a signal line to transmit a signal, a bias circuit to supply a bias voltage to said amplifier element, and one or a plurality of elements connected in parallel to said signal line and having said one or plurality of harmonic processing circuits.

14. The high efficiency amplifier according to claim 1, further comprising an output matching circuit including said one or plurality of harmonic processing circuits to match an impedance of an output signal of said amplifier element, and

said output matching circuit is constituted only of

a signal line to transmit a signal, a bias circuit to supply a bias voltage to said amplifier element, one or a plurality of first elements connected in parallel to said signal line and including said one or plurality of harmonic processing circuits, and one or a plurality of second elements other than a capacitance, said second elements being connected in series with said signal line.

15. A high efficiency amplifier comprising:

an input terminal to receive an input signal;

an output terminal to output a signal;

an amplifier element to amplify said input signal; and

an output matching circuit to match an impedance of an output signal from said amplifier element,

said output matching circuit being constituted only of

a signal line to transmit a signal, a bias circuit to supply a bias voltage to said amplifier element and one or a plurality of elements connected in parallel with said signal line.

16. The high efficiency amplifier according to claim 15, wherein said one or plurality of elements are arranged between said amplifier element and said output terminal and include a harmonic processing circuit to process a harmonic in an output signal of said amplifier element.

17. A high efficiency amplifier comprising:
an input terminal to receive an input signal;
an output terminal to output a signal;
an amplifier element to amplify said input signal; and
an output matching circuit to match an impedance of an output signal of said amplifier element
said output matching circuit being constituted only of
a signal line to transmit a signal, a bias circuit to supply a bias voltage to said amplifier element, one or a plurality of first elements connected in parallel with said signal line, and one or a plurality of second elements other than a capacitance, said second elements being connected in series with said signal line.

18. The high efficiency amplifier according to claim 17 wherein said one or plurality of first elements are arranged between said amplifier element and said output terminal and include a harmonic processing circuit to process a harmonic in an output signal of said amplifier element.

19. A high efficiency amplifier comprising:
an input terminal to receive an input signal;
an output terminal to output a signal;
an amplifier element to amplify said input signal; and
an output matching circuit to match an impedance of an output signal from said amplifier element;
said output matching circuit including a plurality of capacitance elements to cut a direct current bias component in said input signal, and

said plurality of capacitance elements being arranged in parallel between said input terminal and said output terminal.

20. The high efficiency amplifier according to claim 19, wherein each of said plurality of capacitance elements is a chip capacitor.

21. A high efficiency amplifier arranged between a first transmission line of a standard impedance and a second transmission line of an impedance lower than said standard impedance, comprising:

an input terminal to receive an input signal from said first transmission line;

an output terminal connected to said second transmission line;

an amplifier element to amplify said input signal; and

a low impedance line portion formed in a signal path between said input terminal and said output terminal and having an adjustable impedance.

22. The high efficiency amplifier according to claim 21 further comprising,

a harmonic processing circuit arranged between said amplifier element and said output terminal to process a harmonic in an output signal of said amplifier element, wherein

said standard impedance is 50 ohm, and

an output impedance in said output terminal is substantially in the range from 3 ohm to 30 ohm.

23. The high efficiency amplifier according to claim 21, wherein said low impedance line portion includes

a low impedance transmission line to transmit a signal formed to have a portion separable from said signal path.

24. The high efficiency amplifier according to claim 21, wherein said low impedance line portion includes

a low impedance transmission line to transmit a signal, and a pad connectable to said low impedance transmission line and arranged at a predetermined distance from said low impedance transmission line.

25. A high efficiency amplifier arranged between a first transmission line of a standard impedance and a second transmission line of an impedance lower than said standard impedance, comprising

a substrate;

an input terminal to receive an input signal from said first transmission line;

an output terminal connected to said second transmission line;

an amplifier element formed on said substrate to amplify said input signal and

a low impedance line portion formed on said substrate and in a signal path between said input terminal and said output terminal,

said low impedance line portion is formed from a low impedance transmission line to transmit a signal and a high-dielectric constant substrate with a different dielectric constant from said substrate.

26. The high efficiency amplifier according to claim 25, further comprising

a harmonic processing circuit arranged between said amplifier element and said output terminal to process a harmonic in an output signal of said amplifier element,

said standard impedance is 50 ohm and

an output impedance at said output terminal is substantially in the range from 3 ohm to 30 ohm.

27. The high efficiency amplifier according to claim 25, wherein said high-dielectric constant substrate is formed on said substrate.

28. The high efficiency amplifier according to claim 25, wherein said high-dielectric constant substrate is formed in said substrate.

29. A high efficiency amplifier connected between a first transmission line of a first impedance and a second transmission line of a second impedance different from the first impedance, comprising:

an input terminal to receive an input signal from said first transmission line;

an output terminal connected to said second transmission line;

an amplifier element arranged between said input terminal and said output terminal to amplify said input signal and

a low impedance transmission line arranged between said input terminal and said output terminal to transmit a signal,

said low impedance transmission line being formed at a distance away from a ground potential, the distance between said low impedance transmission line and the ground potential being different from a distance between said first transmission line and the ground potential.

30. The high efficiency amplifier according to claim 29, wherein

said second impedance is lower than said first impedance, and

the distance between said low impedance transmission line and the ground potential is shorter than the distance between said first transmission line and the ground potential.

31. A high efficiency amplifier connected between a first transmission line of a first impedance and a second transmission line of a second impedance different from the first impedance, comprising:

an input terminal to receive an input signal from said first transmission line;

an output terminal connected to said second transmission line; and

an amplifier element arranged between said input terminal and said output terminal to amplify said input signal,

said input terminal and said output terminal being different in size according to impedance of a connected transmission line.

32. The high efficiency amplifier according to claim 31, wherein

said second impedance is lower than said first impedance and

a size of said output terminal is larger than a size of said input terminal.

33. A radio transmission device, comprising:

a high efficiency amplifier having an output impedance lower than a standard impedance;

a non-reciprocal circuit element having an input impedance lower than said standard impedance and an output impedance substantially equal to said standard impedance and

a transmission line to connect said high efficiency amplifier and said non-reciprocal circuit element;

said high efficiency amplifier including

an input terminal to receive an input signal,

an output terminal connected to said non-reciprocal circuit element via said transmission line,

an amplifier element to amplify said input signal, and

one or a plurality of harmonic processing circuits arranged between said amplifier element and said output terminal to process a harmonic in an output signal of said amplifier element.

34. The radio transmission device according to claim 33, wherein

said standard impedance is 50 ohm and

an output impedance in said high efficiency amplifier is substantially in the range from 3 ohm to 30 ohm.

35. The radio transmission device according to claim 34, wherein

at least one of said one or plurality of harmonic processing circuits matches impedance of said harmonic.

36. The radio transmission device according to claim 34, wherein

at least one of said one or plurality of harmonic processing circuits suppresses harmonic-related power leakage caused by said harmonic.

37. The radio transmission device according to claim 34, wherein at least one of said one or plurality of harmonic processing circuits serves as an open circuit load to said harmonic.

38. The radio transmission device according to claim 34, wherein at least one of said one or plurality of harmonic processing circuits serves as a short circuit load to said harmonic.

39. The radio transmission device according to claim 33, wherein resonance frequency of said plurality of harmonic processing circuits are different from each other.

40. The radio transmission device according to claim 33, wherein said high efficiency amplifier further includes,

a fundamental wave regulator circuit between said amplifier element and said output terminal to perform a fine adjustment of an impedance of a fundamental wave in an output signal of said amplifier element.

41. The radio transmission device according to claim 33, wherein said harmonic processing circuit is constituted of a capacitance element and a parasitic inductor coupled to said capacitance element.

42. The radio transmission device according to claim 41, wherein said capacitance element is a chip capacitor.

43. The radio transmission device according to claim 41, wherein said parasitic inductor is a microstrip line.

44. The radio transmission device according to claim 33, wherein said high efficiency amplifier further includes,

a coupled circuit, arranged between said amplifier element and said output terminal, including a first output terminal to output power of an

amount corresponding to an input power to said output terminal side, and a second output terminal to output power of an amount corresponding to a predetermined ratio of power output from said first output terminal.

45. A radio transmission device comprising:
a high efficiency amplifier;
a non-reciprocal circuit element; and
a transmission line to connect said high efficiency amplifier and said non-reciprocal circuit element;
said high efficiency amplifier including,
an input terminal to receive an input signal,
an output terminal connected to said non-reciprocal circuit element via said transmission line,
an amplifier element to amplify said input signal, and
an output matching circuit connected to said output terminal to match an impedance of an output signal of said amplifier element,
said output matching circuit being constituted only of
a signal line to transmit a signal, a bias circuit to supply a bias voltage to said amplifier element, and one or a plurality of elements connected in parallel with said signal line,
said non-reciprocal circuit element including
an input matching circuit to match an impedance of an input signal, and
a capacitance element to cut a direct current bias component in said input signal being included only in said input matching circuit.

46. The radio transmission device according to claim 45, wherein
an output impedance in said high efficiency amplifier is substantially in the range from 3 ohm to 30 ohm.

47. The radio transmission device according to claim 45, wherein
said one or plurality of elements are arranged between said amplifier element and said output terminal and include a harmonic

processing circuit to process a harmonic in an output signal of said amplifier element,

said harmonic processing circuit includes a capacitance element and an inductor arranged in series between said signal line and a ground potential.

48. A radio transmission device comprising:

a high efficiency amplifier;

a non-reciprocal circuit element; and

a transmission line to connect said high efficiency amplifier and said non-reciprocal circuit element;

said high efficiency amplifier including,

an input terminal to receive an input signal,

an output terminal connected to said non-reciprocal circuit element via said transmission line,

an amplifier element to amplify said input signal, and

an output matching circuit connected to said output terminal to match an impedance of an output signal of said amplifier element,

said output matching circuit being constituted only of

a signal line to transmit a signal, a bias circuit to supply a bias voltage to said amplifier element, one or a plurality of first elements connected in parallel with said signal line, and one or a plurality of second elements other than a capacitance, connected in series with said signal line,

said non-reciprocal circuit element including

an input matching circuit to match an impedance of an input signal, and

a capacitance element to cut a direct current bias component in said input signal being included only in said input matching circuit.

49. The radio transmission device according to claim 48, wherein

an output impedance in said high efficiency amplifier is substantially in the range from 3 ohm to 30 ohm.

50. The radio transmission device according to claim 48, wherein

said one or plurality of first elements are arranged between said amplifier element and said output terminal and include a harmonic processing circuit to process a harmonic in an output signal of said amplifier element.

said harmonic processing circuit includes a capacitance element and an inductor arranged in series between said signal line and a ground potential.

51. A radio transmission device comprising:

a high efficiency amplifier;

a non-reciprocal circuit element; and

a transmission line to connect said high efficiency amplifier and said non-reciprocal circuit element;

said high efficiency amplifier including,

an input terminal to receive an input signal,

an output terminal connected to said non-reciprocal circuit element via said transmission line,

an amplifier element to amplify said input signal, and

an output matching circuit connected to said output terminal to match an impedance of a signal output from said amplifier element,

said output matching circuit includes

a plurality of capacitance elements arranged in parallel between said input terminal and said output terminal to cut a direct current bias component in said input signal.

52. The radio transmission device according to claim 51, wherein

an output impedance in said high efficiency amplifier is substantially in the range from 3 ohm to 30 ohm.

53. The radio transmission device according to claim 51, wherein each of said plurality of capacitance elements is a chip capacitor.

54. A radio transmission device, comprising:

a high efficiency amplifier having an output impedance lower than a standard impedance;

a non-reciprocal circuit element having an input impedance lower than said standard impedance and an output impedance substantially equal to said standard impedance; and

a transmission line to connect said high efficiency amplifier and said non-reciprocal circuit element;

said high efficiency amplifier including

an input terminal to receive an input signal,

an output terminal connected to said non-reciprocal circuit element via said transmission line,

an amplifier element to amplify said input signal, and

a low impedance line portion formed in a signal path between said input terminal and said output terminal having an adjustable impedance.

55. The radio transmission device according to claim 54, wherein

said high efficiency amplifier further includes

a harmonic processing circuit arranged between said amplifier element and said output terminal to process a harmonic in an output signal of said amplifier element, and wherein

said standard impedance is 50 ohm and

an output impedance in said high efficiency amplifier is substantially in the range from 3 ohm to 30 ohm.

56. The radio transmission device according to claim 54, wherein

said low impedance line portion includes a low impedance transmission line to transmit a signal, formed to have a portion separable from said signal path.

57. The radio transmission device according to claim 54, wherein

said low impedance line portion includes

a low impedance transmission line to transmit a signal and a pad

arranged at a predetermined distance away from said low impedance transmission line and connectable with said low impedance transmission line.

58. A radio transmission device comprising:

a substrate;

a high efficiency amplifier having an output impedance lower than a standard impedance;

a non-reciprocal circuit element having an input impedance lower than said standard impedance and an output impedance substantially equal to said standard impedance; and

a low impedance line portion formed in a signal path between said high efficiency amplifier and said non-reciprocal circuit element formed on said substrate;

said low impedance line portion being formed from a low impedance transmission line to transmit a signal and a high-dielectric constant substrate with a dielectric constant different from said substrate.

59. The radio transmission device according to claim 58, wherein said high efficiency amplifier includes,

an input terminal to receive an input signal,

an amplifier element to amplify said input signal,

an output terminal, and

a harmonic processing circuit arranged between said amplifier element and said output terminal to process a harmonic in an output signal of said amplifier element,

said standard impedance is 50 ohm and

an output impedance in said high efficiency amplifier is substantially in the range from 3 ohm to 30 ohm.

60. The radio transmission device according to claim 58, wherein said high-dielectric constant substrate is formed on said substrate.

61. The radio transmission device according to claim 58, wherein said high-dielectric constant substrate is formed in said substrate.

62. A radio transmission device comprising:

a substrate;

a high efficiency amplifier having an output impedance lower than said standard impedance;

a non-reciprocal circuit element having an input impedance lower than said standard impedance and an output impedance substantially equal to said standard impedance; and

a low impedance transmission line, formed on said substrate, to connect said high efficiency amplifier and said non-reciprocal circuit element,

said low impedance transmission line being formed at a distance from a ground potential, the distance being different from a distance between a transmission line of said standard impedance and the ground potential.

63. The radio transmission device according to claim 62, wherein the distance between said low impedance transmission line and the ground potential is shorter than the distance between transmission line of said standard impedance and the ground potential.

64. A radio transmission device comprising:

a first transmission line of a first impedance;

a second transmission line of a second impedance different from the impedance of said first transmission line;

a high efficiency amplifier connected between said first transmission line and said second transmission line; and

a non-reciprocal circuit element connected to said second transmission line;

said high efficiency amplifier including

an input terminal to receive an input signal from said first

transmission line,

an output terminal connected to said second transmission line, and

an amplifier element arranged between said first transmission line and said second transmission line to amplify said input signal,

said input terminal and said output terminal are different in size corresponding to an impedance of a connected transmission line.

65. The radio transmission device according to claim 64, wherein

said second impedance is lower than said first impedance and

a size of said output terminal is larger than a size of said input terminal.

66. A measuring device comprising:

mount portion to mount a high efficiency amplifier having an output impedance lower than a standard impedance;

a non-reciprocal circuit element having an input impedance lower than said standard impedance and an output impedance substantially equal to said standard impedance;

a transmission line to electrically connect said high efficiency amplifier mounted on said mount portion and said non-reciprocal circuit element; and

a circuit to measure an output from said non-reciprocal circuit element.

67. The measuring device according to claim 66, wherein

an operation of said high efficiency amplifier mounted on said mount portion is measured based on an output from said non-reciprocal circuit element, and

said high efficiency amplifier includes,

an input terminal to receive an input signal,

an output terminal connected to said non-reciprocal circuit element via said transmission line,

an amplifier element to amplify said input signal, and

a harmonic processing circuit arranged between said amplifier element and said output terminal to process a harmonic in an output signal of said amplifier element.